AVCS RATE GYRO FOR MODELS

KM-601 USER MANUAL

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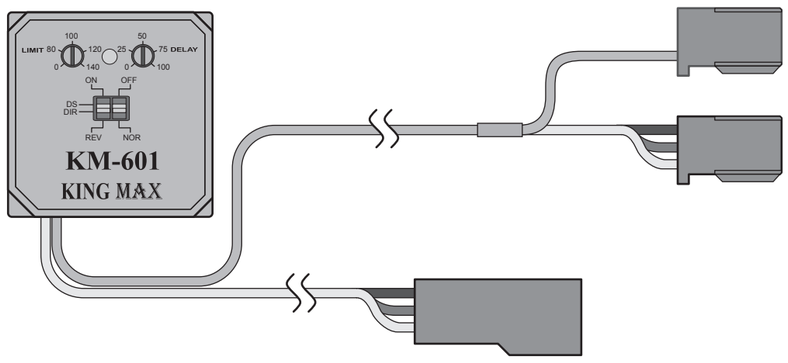


FOREWORD

KM-601 is a high performance, compact, light weight AVCS (Angular Vector Control System) gyro developed for model helicopters. Because the sensor and control circuit are integrated, it is simple to install.
Gyro performance largely depends on the servo used. The higher the speed and response of the servo, the better the gyro sensitivity and performance. From this standpoint, a digital servo is perfect for use with this gyro. The KING MAX high-speed digital servos developed especially for gyro use is recommended. Also, the Futaba high-speed digital servos can work very well wih this gyro.

SAFETY WARNINGS AND PRECAUTIONS

Thank you for buying a KM-601 AVCS gyro. Before using this product, please read the user manual thoroughly and use the product properly and safely.

⚠ IMPROTANT SAFETY INSTRUCTIONS! ⚠

READ ALL INSTRUCTIONS BEFORE USING THIS PRODCUT!

MOUNTING PRECAUTIONS

Always use the double-sided sponge tape to install the gyro to the fuselage.

This is necessary to securely fasten the gyro to the fuselage so that operation of the gyro does not transmit unwanted fuselage vibrations directly to the sensor.

When mounting the gyro, provide a little surplus so that the gyro connection cables are not too taut.

If the gyro cables are too taut, the gyro will not display its full performance. If the gyro peels, control will be lost and result in a dangerous situation.

When using the gyro with a helicopter, install the KM-601 at least 10cm from the drive motor.

The drive motor generates strong electromagnetic noise. This noise may interfere with the gyro sensor and cause erroneous operation.

Mount the KM-601 so that metals or other conductive objects do not touch the gyro case.

The KM-601 uses a conductive resin case to reduce electromagnetic interference. Because the surface of the case is conductive, metal objects may cause a short circuit.

Insert the connectors fully.

If a connector works loose due to vibration during flight, control may be lost and result in a dangerous situation.

Always check the direction of operation of the servos.

If you attempt to fly the model when a servo operates in the wrong direction, the fuselage will spin in a fixed direction and enter an extremely dangerous state.

OPERATION PRECAUTIONS

Never move the fuselage for about 3 seconds after turning on the gyro power (shared with receiver).

Since the data inside the gyro is automatically initialized as soon as the power is turned on, if the fuselage is moved, the neutral position will change. If this occurs, turn the power off and on again. When turning on the power, set the transmitter switch to the AVCS position and turn on the transmitter power switch, then turn on the gyro power.

Do not operate the rudder trimmer while flying in the AVCS mode.

When the power is turned on, the KM-601 assumes that the rudder stick is in the neutral position. If the rudder trimmer is moved during flight, the neutral position will change.

Avoid sudden temperature changes.

Sudden temperature changes will cause the neutral position to change. For instance, do not fly the model immediately after removing it from inside a heated vehicle in the winter and an air conditioned vehicle in the summer. Let the model stand for about 10 minutes to allow the temperature inside the gyro to stabilize before turning on the power. Also, consider sudden temperature changes when the gyro is exposed to direct sunlight or is installed near the engine. Take measures so that the gyro is not exposed to direct sunlight.

When using the gyro in the AVCS mode, set revolution mixing to 0% or OFF.

In the AVCS mode, all rudder corrections are made by the KM-601. Therefore, if rudder mixing is ON, the model will operate the same as if the neutral position changed.
Check the operating time of the receiver, gyro, and servo batteries at the adjustment stage and decide the number of remaining flights while allowing a margin.
When the power was turned on (neutral position memorized in the gyro). When flying in the AVCS mode, set the rudder trim to the same position under all flight conditions, including hovering and idle up. In the AVCS mode, the gyro automatically trims the rudder so that trimming during flight and other precision rudder trim adjustments are unnecessary.

OTHER PRECAUTIONS

When using servos that are not compatible with high-speed pulse drive, other than digital servos, never set the DS switch to ON. The servo may be destroyed.

When the model is static, the servos may move a small step. However, this is because the gyro sensitivity is set to a high value and is normal.

Relationship between servo horn length and gyro sensitivity

Gyro sensitivity also changes with the length of the servo horn. When the sensitivity is too low, length the servo horn. Conversely, when hunting does not stop, shorten the servo horn.

FEATURES

•AVCS system

Since rudder trim changes caused by wind and other meteorological changes and front, rear, forward, reverse, and other helicopter attitude changes are automatically cancelled, tail (rudder) operation is easy, making it perfect for 3D flight.

•Piezo sensor

Use of newly developed extremely low drift Piezo gyro sensor virtually eliminates rudder trim changes during flight.

•Digital servo compatible (DS mode)

DS mode makes it compatible with Futaba digital servos. Maximizes the high-speed response performance of the digital servo.

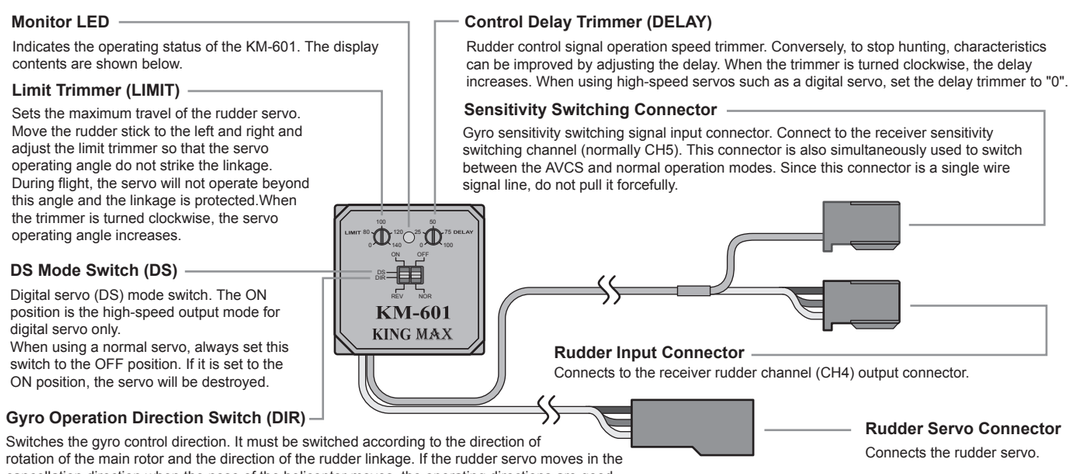
•Remote gain function and mode switching function

Remote gain function allows sensitivity switching from the transmitter and mode switching function allows AVCS/normal gyro mode switching.

KM-601 Ratings：

(Integrated sensor type AVCS rate gyro)
- •Control system:
  Digital advanced PI (Proportional Integration) control
- •Gyro sensor:
  Piezo sensor system vibration gyro
- •Operating voltage: +4 to +6VDC
- •Operating temperature range: -10˚C to +45˚C
- •Dimensions: 28 x 28 x 20mm
- •Weight: 24g (including connector)
- •Functions:
  Gyro operation direction switch, DS mode switch, Control delay trimmer, Limit trimmer, Remote gain control, AVCS/normal mode switching

KM-601 FUCTIONS


Monitor LED
Indicates the operating status of the KM-601. The display contents are shown below.
Limit Trimmer (LIMIT)
Sets the maximum travel of the rudder servo. Move the rudder stick to the left and right and adjust the limit trimmer so that the servo operating angle do not strike the linkage. During flight, the servo will not operate beyond this angle and the linkage is protected.When the trimmer is turned clockwise, the servo operating angle increases.
DS Mode Switch (DS)
Digital servo (DS) mode switch. The ON position is the high-speed output mode for digital servo only.
When using a normal servo, always set this switch to the OFF position. If it is set to the ON position, the servo will be destroyed.
Gyro Operation Direction Switch (DIR)
Switches the gyro control direction. It must be switched according to the direction of rotation of the main rotor and the direction of the rudder linkage. If the rudder servo moves in the cancellation direction when the nose of the helicopter moves, the operating directions are good.
If you try to fly a model with a clockwise rotation rotor when the gyro operation direction is reversed, the nose will turn to the left and result in a dangerous situation.
Control Delay Trimmer (DELAY)
Rudder control signal operation speed trimmer. Conversely, to stop hunting, characteristics can be improved by adjusting the delay. When the trimmer is turned clockwise, the delay increases. When using high-speed servos such as a digital servo, set the delay trimmer to "0".
Sensitivity Switching Connector
Gyro sensitivity switching signal input connector. Connect to the receiver sensitivity switching channel (normally CH5). This connector is also simultaneously used to switch between the AVCS and normal operation modes. Since this connector is a single wire signal line, do not pull it forcefully.
Rudder Input Connector
Connects to the receiver rudder channel (CH4) output connector.
Rudder Servo Connector
Connects the rudder servo.
KM-601
KING MAX

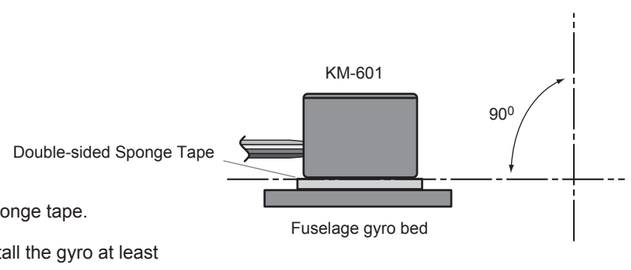
MONITOR LED DISPLAY

LED DISPLAY	GYRO OPERATION STATE
Rapid flash	Displayed while data is being initialized at power ON.
Steady light	Indicates that the gyro is operating in the AVCS mode.
Off	Indicates that the power is OFF, or the gyro is operating in the normal gyro mode.
Slow flash	Displayed when there are no rudder operation signal being input from the transmitter. At this time, the rudder servo does not operate.
Intermittent flash	Alarm display when the power was turned on in the normal gyro mode. For the rudder neutral signal to be read correctly, set the transmitter to the AVCS mode and turn on the gyro power again.
Double flash	Displayed when the rudder signal from the transmitter in the AVCS mode is different from the neutral signal memorized in the gyro. Also flashes when the rudder stick was operated.

INSTALL THE KM-601 TO FUSELAGE

GYRO INSTALLATION

Install the gyro so that the bottom of the gyro is perpendicular to the direction of the main rotor shaft axis. Changes of this axis are also reflected in the roll and pitch directions.



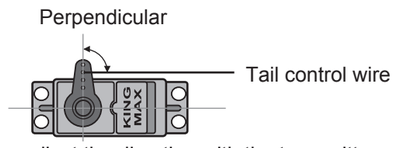
Always install the KM-601 using the double-sided sponge tape.

When using the KM-601 with a motor helicopter, install the gyro at least 10cm from the drive motor.

RUDDER SERVO LINKAGE CHECK

Set the transmitter gyro sensitivity switch to the AVCS position and turn on the transmitter power, then turn on the gyro power (shared with receiver). Since the KM-601 initializes the data when the power is turned on, set the rudder stick to the neutral position and do not move the helicopter for approximately 3 seconds.
If the monitor LED lights, the gyro is operating in the AVCS mode. When the power is turned on in the normal mode, the monitor will display an alarm by flashing intermittently. Set the sensitivity,switch to the AVCS position and turn on the gyro power again. Next, switch the transmitter switch to the normal gyro mode position and check the linkage.

In the rudder neutral position, connect the linkage so that the servo horn and control wire are perpendicular.
Set the servo horn length based on the model manufacturer's instructions.



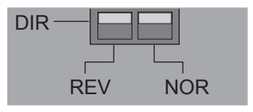
Move the rudder stick to the left and right, and check the direction of operation of the tail rotor. If the tail rotor rotates in the wrong direction, adjust the direction with the transmitter reverse function.

GYRO SENSITIVITY SETTING CRITERIA

The gyro sensitivity differs with the servos used and the fuselage. Generally, the faster the servo operating speed, the higher the gyro sensitivity. Also, when the main rotor speed is raised, the tail sensitivity of the helicopter itself rises and the gyro sensitivity at idle up must be dropped below the sensitivity when hovering. This tendency is greater with 60 class helicopters than with 30 class helicopters. Start sensitivity adjustment with a gyro sensitivity of 70 ~ 80% when hovering and 60 ~ 70% during flight as the criteria and search for the best sensitivity for the helicopter used.

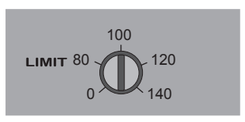
GYRO OPERATION DIRECTION CHECK

If the rudder servo moves to the left when the nose of the helicopter moves to the right, the gyro direction is correct.
If the rudder servo operates in the reverse direction, switch the switch.



LIMIT SETTING

Move the rudder stick to the left and right and adjust the limit trimmer so that the servo operating angle does not strike the linkage. During flight, the servo will not operate beyond this limit and the linkage will be protected. If the setting is too low, the gyro performance will be affected.



RUDDER NEUTRAL POSITION ADJUSTMENT

•When making your first flight and when reconnecting the linkage, set the mechanical rudder neutral position by first flying in the normal mode and then flying in the AVCS mode.
•After completes mechanical neutral position adjustment. Land the helicopter and set the gyro to the AVCS mode. When flying, the power must always be turnedon in the AVCS mode and the rudder neutral position read each time.

•Rudder neutral signal memorization methods

[Method 1] When the gyro power is turned on, the transmitter rudder signal automatically received at that time is assumed to be the neutral signal and is memorized. The gyro is normally used in this state.
[Method 2] Rapidly switch the transmitter sensitivity switch between the AVCS and normal modes at least 3 times at a 1 second or shorter internal, then set the switch to the AVCS mode position. The monitor LED flashes instantaneously and the rudder signal is memorized. If the trimmer was moved during flight, the memorized neutral position can be updated to the current neutral position by repeating this operation. When performing this operation, land the model and hold the rudder stick in the neutral position.

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